

1. Apparatus for relieving zygapophysial joint related pain,  
2 comprising:  
3 a stimulator coupled to a plurality of electrodes, each electrode being  
4 adapted for placement immediately adjacent to a medial branch of a spinal nerve  
5 root,  
6 the stimulator including:  
7 a controller operative to generate a series of pulses of  
8 sufficient electrical intensity to cause stimulation of a given medial branch and its  
9 articular branches, but not so strong as to depolarize or hyperpolarize the spinal cord  
10 itself, and  
11 operator interface enabling the series of pulses to be tailored as  
12 a function of requisite pain relief.
2. The apparatus of claim 1, wherein the stimulator is sealed  
2 within an enclosure suitable for implantation.
3. The apparatus of claim 1, wherein the controller is coupled to  
2 a second set of electrodes to sense myoelectrical activity generated by the muscles  
3 surrounding the medial branch, and wherein the controller is programmed modulate  
4 the impulses generated by the stimulator in accordance with the demands of the  
5 individual.
4. The apparatus of claim 1, wherein the plurality of electrodes

10016615.034102

- 13 -

2 includes at least one positive electrode and more than one negative electrode, the  
negative electrodes each adapted for placement immediately adjacent to the medial  
4 branch of a spinal nerve root, the stimulation of the given medial branch and its  
articular branches being depolarization of the given medial branch and its articular  
6 branches.

5. The apparatus of claim 1, wherein the plurality of electrodes  
2 includes at least one negative electrode and more than one positive electrode, the  
positive electrodes each adapted for placement immediately adjacent to the medial  
4 branch of a spinal nerve root, the stimulation of the given medial branch and its  
articular branches being hyperpolarization of the given medial branch and its  
6 articular branches.

6. The apparatus of claim 1, wherein the series of pulses is a  
2 series of negative electrical pulses.

7. The apparatus of claim 1, wherein the series of pulses is a  
2 series of positive electrical pulses.

8. A method of relieving zygapophysial joint related pain,  
2 comprising the steps of:

providing a stimulator coupled to a plurality of electrodes;  
4 placing each electrode immediately adjacent to a medial branch of a

16043615 034402

spinal nerve root; and

- 6                   generating a series of pulses sufficient to stimulate the medial branch  
and its articular branches, but not so intense as to spread to the spinal cord itself.

9.       The method of claim 8, further including the step of tailoring  
2   the pulses to suit the demands of a user of the stimulator.

10.      The method of claim 8, further including the steps of:  
2           sensing the myoelectrical activity generated by the muscles  
surrounding the medial branch, and  
4           tailoring the pulses in accordance with the myoelectrical activity.

11.      The method of claim 8, further including the step of  
2   implanting the stimulator and electrodes beneath the skin.

12.      The method of claim 8, further including the step of placing  
2   the electrodes under the skin.

13.      Apparatus for relieving pain, comprising:  
2           a stimulator coupled to a plurality of electrodes, each electrode being  
adapted for placement relative to a nerve,  
4           the stimulator including:  
a controller operative to generate a series of positive electrical pulses

10018615.031102

- 15 -

6 of sufficient electrical intensity to cause hyperpolarization of the nerve, but not so  
strong as to spread to the spinal cord itself, and

8 an operator interface enabling the series of pulses to be tailored as a  
function of requisite pain relief.

14. A method of ameliorating pain and treating vascular disorders,  
2 comprising the steps of:

providing a neural stimulator having one negative electrode and one  
4 or more positive electrodes;

placing at least one of the positive electrodes in close proximity to a  
6 peripheral nerve or portion of the autonomic nervous system external to the spinal  
column of a patient being treated;

8 placing the negative electrode remotely from the positive electrode in  
a region of low sensitivity; and

10 providing sufficient energy through the stimulator to hyperpolarize the  
peripheral nerve or portion of the autonomic nervous system.

15. The method of claim 14, including the step of placing at least  
2 one of the positive electrodes proximate to the sciatic nerve.

16. The method of claim 14, including the step of placing the  
2 negative electrode in the adipose tissue.

40018615 031102

17. The method of claim 14, including the step of placing at least  
2 one of the positive electrodes under the skin immediately adjacent the peripheral  
nerve or portion of the autonomic nervous system.

18. The method of claim 14, including the step of placing the  
2 negative electrode under the skin.

19. The method of claim 14, including the step of placing the  
2 stimulator under the skin.

20. The method of claim 19, wherein the stimulator is placed in  
2 the superior buttock region of the patient.

21. The method of claim 14, further including the step of adjusting  
2 a characteristic of energy provided by the stimulator as a function of the needs of the  
patient.

22. The method of claim 21, wherein the adjusted characteristic is  
2 the pulse frequency of the stimulator.

23. The method of claim 21, wherein the adjusted characteristic is  
2 the pulse width of the stimulator.

10018615.034102

24. The method of claim 21, wherein the adjusted characteristic is  
2 the pulse amplitude of the stimulator.

25. A method of ameliorating pain and treating vascular disorders,  
2 comprising the steps of:

providing a neural stimulator having one negative electrode and one  
4 or more positive electrodes;

placing at least one of the positive electrodes under the skin of a  
6 patient immediately adjacent the sciatic nerve;

placing the negative electrode under the skin of the patient in the  
8 adipose tissue at a site remote from the positive electrode; and

providing sufficient energy through the stimulator to hyperpolarize the  
10 sciatic nerve.

26. The method of claim 25, including the step of placing the  
2 stimulator under the skin in the superior buttock region of the patient.

27. The method of claim 25, further including the step of adjusting  
2 the pulse frequency, pulse width, or the pulse amplitude of the stimulator as a  
function of patient need.

10018615.034102